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MESSAGE TO BE TRANSMITTED

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Purpose:

This Addendum to NASA Parts Advisory NA-044 is being issued to provide updated information to the status of various EEE parts specifications with respect to the allowance or prohibition of pure tin finishes. Pure tin finishes have been associated with potential risks stemming from the growth of tin whiskers. See NA-044 for details about the tin whisker phenomenon.

The following attachment has been updated to include information that was not available at the time of publication of the original Advisory. Updates to the table have been identified by two asterisks (**) in the Specification Number column.

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Attachment to NASA Parts Advisory NA-044 (As Revised for NA-044A dated 12/17/98)

Current Specification Status with Respect to Pure Tin for Commonly used EEE Part (Military) Specifications

This attachment has been prepared to provide additional guidance in support of **NASA Parts Advisory NA-044** dated 10/23/98. The table below includes a listing of EEE part procurement specifications (Military and NASA) that are commonly used for spaceflight part procurements.

The table provides:

- Date of the most current specification revision
- Brief explanation of the current “Pure Tin Prohibition Status” within the specification
- Date and revision of the specification when the prohibition language was added (if at all)
- Brief comments regarding the risk associated with the given specification

Based on the information provided, users can roughly determine the timeframe (lot date code) when the manufacturer was restricted from producing pure tin plated components. However, the exact date when a given manufacturer’s product ceased to include pure tin has not been determined.

Notes:

- 1) The attachment does not cover ALL EEE part procurement specifications being used in spaceflight programs. This list only encompasses the more commonly used specifications within NASA. Numerous contractor-specific Source Control Drawings (SCD) are also in use which may or may not prohibit the use of pure tin plating. Many of these SCDs are based upon the equivalent or similar military specification for that commodity. The specific language in each SCD should be reviewed to determine if pure tin plating is restricted.
- 2) This table covers the Base specification requirements only. In some instances, the detail specification sheet (slash sheet) or MS drawing may limit the plating finish to specific materials; thereby possibly prohibiting the use of pure tin. Therefore, a review of the slash sheets may be required to determine if pure tin plating is restricted.
- 3) Based on experience, the following commodities appear to be the ones most at risk for whisker formation. Particular attention to these commodity types is suggested:
 - Relays
 - Connectors
 - Filters
 - Bus Wire
- 4) The complexity of some commodities such as connectors, wire and cable has made the completion of the table in those commodity sections difficult. Updates to this table will be provided at a later date and will be made accessible via the homepage:

<http://misspiggy.gsfc.nasa.gov/whisker>

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Specification Number	Current Specification Revision Date	Current Pure Tin Prohibition Status	Specification Revision When Pure Tin Prohibition Introduced	Comment
Capacitors				
MIL-PRF-20 (Ceramic)	05/06/93 Rev H Am 2	Pure tin is allowed on terminals	N/A	Packaging is non-metallic. Not likely to be a concern since most spaceflight programs solder dip terminals prior to use
MIL-PRF-123 (Ceramic)	07/06/98 Rev B Am 5	Pure tin is allowed on chip capacitor terminations only	N/A	Termination "W" allows pure tin or tin-lead terminations
MIL-PRF-23269 (Glass)	08/06/93 Rev E Am 1	No pure tin allowed. Minimum of 3% lead.	08/06/93 Rev E Am 1	
MIL-PRF-39003 (Tantalum)	05/22/98 Rev H Am 4	No pure tin allowed. Minimum of 3% lead.	08/06/93 Rev H Am 2	
MIL-PRF-39006 (Tantalum)	07/07/98 Rev E Am 1	No pure tin allowed on terminals. However, spec does not prevent tin plated cases.	12/24/93 Rev D Am 1	Not likely to be a problem. Most, if not all designs, use tantalum cases that are sleeved. Tantalum cases are not likely to be plated.
MIL-PRF-39014 (Ceramic)	09/16/97 Rev F	No pure tin allowed. Minimum of 3% lead.	11/23/93 Rev E Am 4	Packaging is non-metallic. Not likely to be a concern since most spaceflight programs solder dip terminals prior to use
MIL-PRF-49467 (Ceramic)	07/15/98 Rev A Am 2	No pure tin allowed. Minimum of 3% lead.	05/19/97 Rev A	Packaging is non-metallic. Not likely to be a concern since most spaceflight programs solder dip terminals prior to use
MIL-PRF-49470 (Ceramic)	07/15/98 Am 1	No pure tin allowed. Minimum of 3% lead.	11/19/97 Base	Packaging is non-metallic. Not likely to be a concern since most spaceflight programs solder dip terminals prior to use
MIL-PRF-55365 (Tantalum)	04/13/98 Rev D Am 1	No pure tin allowed. Minimum of 3% lead.	08/02/93 Rev C Am 4	

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MIL-PRF-55681 (Ceramic)	06/29/98 Rev E Am 1	Pure tin is allowed	N/A	A precautionary note exists in spec as of 07/3/94. However, this does not prohibit pure tin. Termination "W" allows pure tin or tin-lead terminations.
MIL-PRF-83421 (Film)	12/30/93 Rev B Am 3	No pure tin allowed. Minimum of 3% lead.	07/04/93 Rev B Am 2	
MIL-PRF-87217 (Film)	02/23/94 Am 4	Pure tin is not expressly disallowed. See MIL-PRF-83421.	N/A	Parts are made as MIL-PRF-83421 so they should be covered by the same prohibition
Connectors and Accessories				
**MSFC 40M38277	04/23/91 Rev B, EO 15	Pure tin finish is required for type NLS3H solder mount connectors only. Passivated stainless steel or nickel over aluminum is used on all other connectors. All contacts are gold plated.		Review use of NLS3H type connectors.
**MSFC 40M38298	09/24/90 Rev B, EO 9	Pure tin is required for the shell of type NBS3H hermetic connectors and for the soldercups of type NBS0H and NBS3H hermetic connectors. All other connectors are nickel coated. Contacts and engagement surfaces of hermetic connector contacts are gold plated.		Review use of NBS3H connectors. Also, the wire installation process for types NBS0H and NBS3H should be reviewed to determine if solder joints are fully reflowed with tin/lead solder or if they are protected with plastic sleeves.

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**MSFC 40M39569	07/20/83 Rev E	Pure tin is required for type NB3H solder mount connector shell only. All other connectors are passivated stainless steel or nickel coated aluminum. All contacts are gold plated.		Review use of NB3H types.
**GSFC S-311-P-4	09/05/91 Rev D	No pure tin allowed. Connectors and contacts are gold plated.		
**GSFC S-311-P-10	09/21/92 Rev D	No pure tin allowed. Connectors and contacts are gold plated.		
**GSFC S-311-P-718	09/05/91 Base Rev	No pure tin is used on connectors or contacts. Connector shells are nickel plated or chemically treated. Contacts are gold plated.		
**MIL-C-5015	03/15/94 Rev G Am 5	No pure tin is used on connectors or contacts. Soldercup contacts are pretinned with Sn60 tin-lead solder inside the solder well.		
**MIL-C-24308	11/12/97 Rev D Am 2	Pure tin is required on Class H (Hermetic) shells and contact bodies. Latest revision of MIL-PRF-23408/9 is not clear on material and finish for space. Page 1 and 2 are in conflict. Page 1 lists Class K while page 2 lists Class M non-magnetic. Previous revision listed space grade to be Class K.		Class H connectors are likely to be pure tin plated. However, most NASA programs do not recommend use of Class H parts.

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**MIL-C-26482	01/03/91 Rev G Am 5	Pure tin is required for Series 1 and 2 hermetic seal connectors. Series 1 solder type contacts are also pure tin plated.		Review use of these connectors.
**MIL-PRF-83513	04/22/97 Rev D	No pure tin is used. Space grade connectors are coated with electroless nickel.		
**MIL-C-83517	07/07/98 Am 4	No pure tin is used. Solder type contacts are gold plated. Connector body is stainless steel. Finish is passivated or gold plated. Contact is gold plated.		
**MIL-C-38999	04/06/90 Rev J	Pure tin is required for Series I and II hermetic seal connectors only. Solder contacts for hermetic connectors are gold plated. The current unreleased Rev K draft includes a pure tin prohibition with 3% lead minimum.		
**MIL-PRF-39012	07/07/98 Rev D Am 2	No pure tin is used. Beryllium copper connectors are gold plated. Stainless steel connectors are passivated. Contacts are gold plated on all surfaces.		

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**MIL-C-39029	05/02/88 Rev D	No pure tin is allowed. Solderless wrap termination areas and certain solder terminated contacts are pre-tinned with tin-lead alloy		
**MIL-C-55302	04/09/86 Rev E	No pure tin is allowed. Solder contact termination end plating is tin-lead (50-70%) composition.		
**MIL-C-85049	08/30/90 Rev A	No pure tin is used.		
Crystals				
MIL-O-55310	03/25/98 Rev D	No pure tin allowed. Minimum of 3% lead.	03/15/94 Rev C	
Discrete Semiconductors (Diodes/Transistors)				
MIL-S-19500	09/08/97 Rev K Am 1	No pure tin allowed. Minimum of 3% lead.	04/15/94 Rev J	
Filters				
MIL-PRF-15733	11/15/96 Rev G Am 5	No pure tin allowed. Minimum of 3% lead.	12/31/93 Rev G Am 4	
MIL-PRF-28861	09/11/98 Rev B Am 4	No pure tin allowed. Minimum of 3% lead.	01/31/94 Rev B	

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Fuses				
MIL-PRF-23419 (Fuses)	06/12/98 Rev E Am 3	No pure tin allowed. Minimum of 3% lead.	06/01/94 Rev E Am 1	
MIL-PRF-39019 (Circuit Breakers)	08/27/97 Rev D	Pure tin is allowed		
Inductors				
MIL-C-39010	08/27/97 Rev E	No pure tin allowed. Minimum of 3% lead.	01/04/94 Rev D	
MIL-PRF-83446	10/03/94 Rev B Am 4	No pure tin allowed. Minimum of 3% lead.	10/03/94 Rev B Am 4	
MIL-STD-981	02/10/94 Rev B	Solder is not allowed to be pure tin. However, no min lead content is specified	02/10/94 Rev B	
Microcircuits				
MIL-M-38510	08/27/93 Rev J Not. 1	Pure tin is allowed.		
MIL-PRF-38534	09/12/96 Rev C Am 1	No pure tin allowed on terminations. Minimum of 2% lead. No language about package plating restrictions	08/23/95 Rev C	
MIL-PRF-38535	12/01/97 Rev E	No pure tin allowed.	03/14/95 Rev C	

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Relays				
GSFC S-311-P-2(06)	03/16/92	Inactivated. Last rev allowed pure tin. Superseded by S-311-P-754.	N/A	
GSFC S-311-P-754	09/25/98 Rev D	No pure tin allowed. Minimum of 3% lead.	09/25/98 Rev D	
MIL-PRF-6106	12/01/97 Rev K	No pure tin allowed. Minimum of 3% lead.	12/01/97 Rev K	
MIL-PRF-39016	06/30/98 Rev E Am 2	No pure tin allowed. Minimum of 3% lead.	07/18/94 Rev E	
MIL-PRF-83536	12/19/97 Rev A Am 1	No pure tin allowed. Minimum of 3% lead.	03/21/97 Rev A	
Resistors				
**GSFC S-311-P-672	04/06/98 Rev E	Termination material is not specified. See comment.		The manufacturer of this product uses 60/40 tin-lead over Dumet wires for this product. Not a whisker risk.
**GSFC S-311-P-683	07/02/96 Rev A	No Pure tin allowed. Terminals have either 60/40 or 63/37 tin-lead.		
**GSFC S-311-P-742	12/26/95 Rev C	No Pure tin allowed. Terminals have either 60/40 or 63/37 tin-lead.		
**GSFC S-311-P-813	03/09/98 Rev B	No pure tin allowed. Minimum of 30% lead Type C32 and C52 terminals per MIL-STD-1276D		
MIL-PRF-39005 (Wirewound)	03/16/98 Rev E Am 1	No pure tin allowed. Minimum of 3% lead.	07/01/93 Rev D Am 2	Packaging is non-metallic. Not likely to be a concern since most spaceflight programs solder dip terminals prior to use

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MIL-PRF-39007 (Wirewound)	07/03/97 Rev H	No pure tin allowed. Minimum of 3% lead.	03/23/93 Rev G Am 1	Packaging is non-metallic. Not likely to be a concern since most spaceflight programs solder dip terminals prior to use
MIL-PRF-39008 (Carbon Comp.)	04/11/97 Rev C Not.1 Inactivated	No pure tin allowed. Minimum of 3% lead.	05/05/93 Rev C Am 1	Packaging is non-metallic. Not likely to be a concern since most spaceflight programs solder dip terminals prior to use
MIL-PRF-39009 (Wirewound)	07/03/97 Rev D	A "Note" in Section 6 "prohibits" pure tin but does not specify a min lead content. Terminals require minimum of 40% lead.	01/27/94 Rev C Am 1	
MIL-PRF-39015 (Variable)	06/09/98 Rev D Am 1	No pure tin allowed. Minimum of 3% lead.	04/27/93 Rev C Am 2	
MIL-PRF-39017 (Film)	05/19/97 Rev F	No pure tin allowed. Minimum of 3% lead.	07/01/93 Rev E Am 2	Packaging is non-metallic. Not likely to be a concern since most spaceflight programs solder dip terminals prior to use
MIL-PRF-55182 (Film)	09/17/98 Rev G Am 3	No pure tin allowed. Minimum of 3% lead.	08/11/93 Rev F Am 2	Packaging is non-metallic. Not likely to be a concern since most spaceflight programs solder dip terminals prior to use
MIL-PRF-55342 (Film)	09/17/98 Rev G Am 1	No pure tin allowed. Minimum of 3% lead.	05/10/93 Rev E Am 2	
MIL-PRF-83401 (Network)	03/18/96 Rev G	No pure tin allowed. Minimum of 3% lead.	06/11/93 Rev F Am 3	
MIL-PRF-914 (Network)	12/19/97 Rev A Am 1	No pure tin allowed. Minimum of 3% lead.		

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Thermistors				
MIL-T-23648	06/15/98 Rev D Am 1	No pure tin allowed. Minimum of 3% lead.	04/15/93 Rev C Am 1	
GSFC S-311-P-18	05/12/95 Rev G	Pure tin is allowed	N/A	
Transformers				
MIL-T-27	06/06/94 Rev E Am 2	Pure tin is allowed		
MIL-STD-981	02/10/94 Rev B	Solder is not allowed to be pure tin. However, no min lead content is specified	02/10/94 Rev B	
Wire and Cable				
**S-311-P-13	06/07/96 Rev B	Pure tin is required for all wire		Pure tin coated wire is recommended for solder applications only. Tin whisker growth is only a risk in areas where the insulation has been removed and the wire has not been coated with solder.

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**MIL-C-17	01/08/96 Rev G Am 3	Pure tin is required for the outer conductor of certain dash numbers of semi-rigid copper clad cable.		There is no impact on standard part numbers used by NASA.
**J-W-1177	10/16/96 Rev B Not. 1	Tin coating is not permitted. The superseding document NEMA MW-1000 does not permit tin plating.		
MIL-W-22759	05/07/91 Rev E Am 1	Pure tin plating is allowed on some styles including (but not limited to) /16, /18, /32, /34	N/A	Pure tin coated wire is recommended for solder applications only. Tin whisker growth is only a risk in areas where the insulation has been removed and the wire has not been coated with solder.
MIL-W-81381	09/08/87 Rev A Not. 1	Pure tin is required for detail specifications /21 and /22 only.		Pure tin coated wire is recommended for solder applications only. Tin whisker growth is only a risk in areas where the insulation has been removed and the wire has not been coated with solder.

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